Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1
A984m
MP-1265
Supersedes
Date received 4/17/73

Central Swine-Testing and Purebred-Improvement Programs in the United States

Miscellaneous Publication No. 1265

USDA LIBRARY
File Copy
Do Not Loan
Date:

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

1973

CONTENTS

	Page
Central swine-testing programs	1
Types of tests	4
Entrance requirements	5
Test evaluation procedures	6
Qualification standards	9
Physical facilities and utilization	10
Future of central swine-testing stations	14
Purebred-improvement programs	16
Litter and sire certification	16
Additional purebred-testing programs	17

Washington, D.C. Issued March 1973

For sale by the Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C. 20402
Price : 25 cents, domestic postpaid; 15 cents, GPO Bookstore
Stock No. 0100-02783

Central Swine-Testing and Purebred-Improvement Programs in the United States

By B. Bereskin, *Genetics and Management Laboratory,* R. J. Davey, *Nonruminant Nutrition Laboratory, Northeastern Region,* and R. J. Gerrits, *Livestock and Veterinary Services National Program, Agricultural Research Service*

CENTRAL SWINE-TESTING PROGRAMS

Organized central swine testing began in 1907 in Denmark. Four slaughter pigs from one litter were fed together under standard conditions from about 45 to 200 pounds. Rate of gain, feed conversion, and several carcass traits were measured. The primary objective was to improve the accuracy of evaluating the genetic merit of breeding stock by considering the performance of closely related animals under uniform test conditions.

In the early 1920's, several other countries started their own central swine-testing programs, largely patterned after that of the Danes. The U.S. Department of Agriculture and several States also initiated central swine testing during that period. However, by the early 1930's all such efforts were discontinued in this country.[1]

In 1954, Ohio State University began the first of the current central swine-testing programs in the United States, based on a slaughter gilt and barrow from one litter. This was followed in 1956 with a new station in Ames, Iowa, where the first U.S. program for central testing of boars was initiated, with L. N. Hazel of Iowa State University as adviser. Minnesota opened a station the next year, and by the end of 1971, 36 central swine-testing stations were in operation in 26 States.

Over the years each of these States generally has developed separate guidelines for its own central testing programs, largely independent of programs in other States. As a result, many differences have evolved in the types of tests conducted, entrance requirements, methods of measurement, feeding and management practices, and evaluation procedures. This has led to increased difficulties in interpreting and making useful comparisons of test results from the various stations.

---

[1] Craft, W. A. the development of swine testing. Amer. Livestock Jour. 125 (10): 18–20. 1960.

To evaluate the present situation in the United States, a survey on various aspects of central swine testing was conducted in 1971 with the cooperation of State agricultural college personnel and others associated with the testing programs. This survey was summarized in detail.[2] Its key points are discussed in this publication.

The following list includes the State agricultural college personnel to contact for information on central swine-testing stations in the respective 26 States that currently have such programs. These individuals are primarily responsible for providing liaison between the testing stations and swine producers. Of the 26 persons, 16 are on the staff of their respective State agricultural extension service, eight are engaged in teaching, research, or both, and two supervise university testing programs. Fifteen of the twenty-six also serve as managers of central swine-testing stations.

Alabama: Dr. T. W. High, Jr., Extension Animal Husbandman, Cooperative Extension Service, Auburn University, Auburn, Ala. 36830.

Arkansas: Dr. Paul R. Noland, Professor of Animal Science, University of Arkansas, Fayetteville, Ark. 72701.

California: Dr. R. E. Busch, Swine Supervisor, PSA 221, Chico State College, Chico, Calif. 95926.

Colorado: Dr. Marvin W. Heeney, Associate Professor, Cooperative Extension Service, Colorado State University, Fort Collins, Colo. 80521.

Florida: Ken L. Durrance, Associate Professor, Cooperative Extension Service, University of Florida, Gainesville, Fla. 32601.

Georgia: Dr. O. M. Hale, Professor of Animal Science, University of Georgia Coastal Plain Experiment Station, Tifton, Ga. 31794.

Illinois: Dr. Gary L. Cowman, Department of Agriculture, Western Illinois University, Macomb, Ill. 61455.

Indiana: Dr. Kenneth J. Drewry, Extension Animal Scientist, Cooperative Extension Service, Purdue University, Lafayette, Ind. 47907.

Iowa: Dr. Emmett J. Stevermer, Extension Livestock Specialist, 109 Kildee Hall, Iowa State University, Ames, Iowa 50010.

Kansas: Dr. R. H. Hines, Associate Professor of Animal Science, Kansas State University, Manhattan, Kans. 66502.

Louisiana: John E. Pontif, Assistant Professor of Animal Science,

---

[2] Limited copies of this summary, "Central Swine Testing in the United States," are available at no charge from the Genetics and Management Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md. 20705.

Dean Lee Agricultural Experiment Station of Louisiana State University, Rt. 2, Alexandria, La. 71301.

Maryland: William A. Curry, Extension Livestock Specialist, Cooperative Extension Service, University of Maryland, College Park, Md. 20742.

Michigan: E. C. Miller, Extension Swine Specialist, Department of Animal Husbandry, Michigan State University, East Lansing, Mich. 48823.

Minnesota: Dr. Charles J. Christians, Extension Animal Husbandman, Agricultural Extension Service, University of Minnesota, St. Paul, Minn. 55101.

Mississippi: Dr. H. W. Miller, Professor of Animal Science, Mississippi State University, Mississippi State, Miss. 39762.

Missouri: R. K. Leavitt, Supervisor of Livestock Evaluation Centers, Animal Husbandry Department, University of Missouri, Columbia, Mo. 65201.

Montana: Dr. C. W. Newman, Associate Professor of Animal Science, Montana State University, Bozeman, Mont. 59715.

Nebraska: Dr. William T. Ahlschwede, Extension Livestock Specialist, Cooperative Extension Service, University of Nebraska, Lincoln, Nebr. 68503.

North Carolina: J. R. Woodard, Extension Animal Husbandry Specialist, Agricultural Extension Service, North Carolina State University, Raleigh, N.C. 27607.

Ohio: Dr. Gene A. Isler, Extension Specialist, Animal Science, Ohio State University, Columbus, Ohio 43210.

Oklahoma: Dr. William G. Luce, Extension Swine Specialist, 105 Animal Husbandry Building, Oklahoma State University, Stillwater, Okla. 74074.

Pennsylvania: Robert L. Kimble, Director, Pennsylvania Meat Animal Evaluation Center, Pennsylvania State University, University Park, Pa. 16802.

South Dakota: L. J. Kortan, Extension Livestock Specialist, Cooperative Extension Service, South Dakota State University, Brookings, S. Dak. 57006.

Tennessee: Frank B. Masincupp, Assistant Professor, Department of Animal Husbandry, University of Tennessee, Knoxville, Tenn. 37901.

Virginia: John H. Carter, Jr., Extension Specialist, Animal Science, Virginia Polytechnic Institute, P.O. Box 217, Holland, Va. 23391.

Wisconsin: Carl W. Hirschinger, Extension Livestock Specialist, Department of Meat and Animal Science, University of Wisconsin, 1675 Linden Drive, Madison, Wis. 53706.

Types of Tests

Tests are conducted by the stations on slaughter pig groups, on boars for potential use as breeders, and on a combination of the two (table 1). The slaughter pig group, as tested in 13 States, usually consists of two to six pigs from one or more litters of the same sire, with both barrows and gilts generally required or preferred. This test can serve either as a sib or progeny test for related animals and has been popular with purebred breeders participating in litter and sire certification programs of their respective breed associations.

TABLE 1.—*Swine-testing stations, types of test groups, and test-group capacity in various States*

State	Testing stations	Types of test groups [1]	Test-group capacity [2]
	Number		*Number*
Alabama	1	Combination	60
Arkansas	1	do	20
California	1	do	12
Colorado	1	Slaughter pigs	12
Florida	1	do	30
Georgia	1	Boars	96
Illinois	1	Slaughter pigs, combination	80
Indiana	1	Boars	96
Iowa	5	Combination	318
Kansas	1	do	40
Louisiana	1	Slaughter pigs, combination	50
Maryland	1	do	20
Michigan	1	Slaughter pigs	20
Minnesota	1	do	98
Mississippi	1	Combination	24
Missouri	2	Boars, combination	102
Montana	1	Slaughter pigs	12
Nebraska	2	Combination	110
North Carolina	1	Slaughter pigs	100
Ohio	1	Slaughter pigs, boars, combination.	130
Oklahoma	1	Combination	24
Pennsylvania	1	Slaughter pigs	20
South Dakota	1	Boars	24
Tennessee	2	Combination	48
Virginia	1	Slaughter pigs	40
Wisconsin	3	do	178
	1	Combination	60

[1] See text for description of test groups.

[2] Total testing capacity in State at one time.

Five States presently conduct individual performance tests on groups consisting only of one to four boars. Four of these States rely heavily on ultrasonics to estimate carcass merit on the live animal.

The combined tests in 15 States are made in groups consisting of from one to four boars plus one or more related slaughter pigs, all by the same sire. The boars are tested on individual performance, whereas the slaughter pigs serve as a sib test in providing carcass information not obtainable from the boars. Four States offer facilities for two of the three types of tests and one State, Ohio, conducts all three types for consignors.

Entrance Requirements

All test stations devote considerable attention to animal health and require some evidence that test pigs and their source herds are healthy. This generally is in the form of a health certificate from a licensed veterinarian specifying that the source herd is disease-free and that consigned test pigs are vaccinated, blood tested, or both for certain infectious diseases. However, the specified diseases and other details of health requirements vary considerably from State to State.

All stations require that test pigs be individually earmarked and that castrates be healed. Many stations also do not accept test pigs showing evidence of inherited defects such as hair swirls, hernia, inverted nipples, and cryptorchidism.

Stations in 17 States require that test animals be from litters of at least eight pigs farrowed alive. Six States require more complete farrowing and weaning information on test litters. Nine States have minimum standards for number and placement of teats in boar test pigs.

Most States limit testing to within-State producers, and the others give local producers priority in testing. Several stations require that consignors be members of State swine producer associations or similar organizations. Most States require that test animals either be eligible for purebred registry or be from litters so eligible. This is especially true for boars, with only registered boars eligible for public auction after the test period.

Stations in all States have either age or weight specifications that consigned pigs must meet when delivered to the testing facility. These are summarized in table 2. Age limits for entries range from a minimum of 42 to a maximum of 80 days. Most States also require that entries conform to a certain range in weights, varying from a minimum of 30 to a maximum of 75 pounds. The range in entry weights varies widely among States.

The specifications of ages and weights when pigs actually are put

TABLE 2.—*Specifications of States for age and weight of swine at delivery and when put on test*

State	At delivery [1]		When put on test [2]	
	Age	Weight	Age or time	Weight
	Days	*Pounds*	*Days*	*Pounds*
Alabama	50–60		70	
Arkansas		40–50	[3] 5	
California		60 (max.)		60
Colorado	75 (max.)	35–65	[3] 3	
Florida	80 (max.)	30 (min.)	[3] 6–7	
Georgia	51–64	35–60	Immediately	
Illinois		50 (max.)		60
Indiana		40–60		60
Iowa		35–50		60
Kansas		50–65		65
Louisiana	56–70	40–60	[3] 1–4	
Maryland		40–60	Immediately	
Michigan	50–62		63	
Minnesota	70 (max.)	35–55		60
Mississippi		35–75		60–75
Missouri	42–70	30–50		60
Montana		35–55		60
Nebraska		35–50		55
North Carolina	50–60	40–70	65	
Ohio		35–45		55–60
Oklahoma	80 (max.)	40–70		80
Pennsylvania	80 (max.)	35–75	[3] 7	
South Dakota		35–55	[3] 1–3	
Tennessee	50–60	45 (min.)	70	
Virginia	50–65	35 (min.)	63–65	
Wisconsin		40–55		65

[1] For individual pigs.
[2] Test group average.
[3] After delivery.

on test also vary considerably, as shown in table 2. This variability mostly reflects differences in time between delivery of pigs to the station and the start of testing. Within the framework of the various entrance requirements, a consignor has the right to select the specific pigs from his herd to be tested.

Test Evaluation Procedures

Feeding Practices.—Test rations differ considerably in ingredients and in composition among the States, especially in number and kind

of protein supplements used. For example, soybean meal is used as the only protein supplement in 15 States, whereas it is used in combination with one or two of the following supplements in the other 11 States: Meat scraps, meat and bonemeal, tankage, fishmeal, and fish solubles. In addition, test rations include the following, either alone or in combination with one or two other ingredients in this group: Alfalfa meal in eight States, molasses in six, dried whey in three, and fat in one State.

On the other hand, less variability is noted in grains used in test rations among States. Yellow corn is the only grain included in 22 States, whereas milo or barley was the only grain in one State each. Two States use a combination of corn with milo or oats.

Stations in 15 States feed a single protein level for the entire test period, with two using 17 percent, one 18 percent, and the other 12 States 16 percent of protein in the rations. However, five of these States use a conditioner feed for a short period when pigs are first put on test. The other States vary the protein level in the ration for the first and last parts of the test period. During the initial or growing period—generally up to 100 or 125 pounds in weight for the test group—(crude) protein levels of 16 to 18 percent are fed. During the last or finishing period, protein levels range from 12 to 16 percent. In addition, all States but Maryland include at least one form of antibiotic in the rations. All rations are self-fed, usually in pelleted form.

Live Animal Traits.—All stations except Virginia include average daily gain (ADG) and feed conversion ratio (FC) for the test period in their published reports of results for live animal traits measured. Virginia reports age in days to 220 pounds in place of ADG. FC is measured in terms of feed required per unit weight gain based on the entire test pen of two or more hogs in all States except Georgia, where boars are tested individually.

Fourteen States use the probing technique and 10 States use ultrasonics to estimate backfat thickness (BF), loin eye area (LEA), or both in test boars. If these ultrasonic measures are used to estimate the percent of ham and loin (H–L) or percent of lean cuts (L–C) in the boar, they are so reported. Other States either are preparing to use ultrasonics in their evaluation procedures or are considering it. Several States also report information on various other measures on live animals, such as weight on and weight off and an estimate of fat-free lean in the body, but the trend is toward use of fewer live animal traits in evaluation.

Slaughter Traits.—Marked differences among stations in off-test procedures prior to slaughter also add significantly to the problem of comparing test results. Sources of variation during this period include

494-452 O - 73 - 2

time of day for off-test weighing, amount of preslaughter feeding and watering, time of shipment to slaughter relative to off-test weighing, distance to slaughtering facility, and timing of preslaughter weighing.

Off-test weights are taken followed by slaughter the same day at about half the stations, whereas slaughter takes place the following day at the other stations. Slaughter weights may be taken before or after shipping to the abattoir or even may not be taken at all. Distance to slaughter facilities ranges from under 1 mile to over 100, and these facilities may be either university meat laboratories or commercial packing plants.

In all 23 States that test slaughter pigs, information is reported on carcass length, average BF, and LEA. In addition, nine States provide information on percent of H–L, six on percent of L–C, four on both measures, two on an H–L index, one on all three measures, and one on an estimated percent of muscle in the carcass. Seventeen States base these percentages on chilled carcass weight, whereas six use off-test weight.

Several States also provide a variety of other carcass data, such as dressing percent, percent ham, and individual BF measures. But here, too, as with live animal traits, the trend is toward use of fewer such measures in evaluation. On the other hand, interest has increased considerably in evaluating meat quality. Seven States now provide a variety of such information, and several others are planning expanded programs in this area.

Record Adjustments and Indexes.—Most States evaluating slaughter pigs adjust days-to-final-weight, carcass length, average BF, and LEA to a 220-pound live hog basis, using standard correction factors of the National Association of Swine Records. Most States taking ultrasonic measurements on boars also adjust these values to a 220-pound basis. Several States follow other procedures such as adjusting records for sex or age or else making no adjustments. Where used, adjustment methods generally are specified in published reports on test results.

Of the 14 States presently computing indexes for test boars, nine include no carcass information in one form of index used. Six of the latter States—Arkansas,[3] Iowa, Kansas, Missouri (Maryville), Nebraska, and South Dakota—use the same index (I):

$$I=250+50\ (ADG)-50\ (FC)-50\ (\text{average BF probe})$$

ADG during the test period and BF probe are based on individual

[3] Arkansas uses this boar index when slaughter pigs are *not* littermates of the tested boar. If slaughter pigs *are* littermates of the boar, it computes a different boar index, as noted subsequently.

performance, whereas FC is based on pen average for the test period. This index, used first in Iowa, originally was intended to place equal emphasis in selection on each of the three traits. However, whether the index has, in fact, produced the desired results has not been determined.

Oklahoma, with an index of the same traits, uses a 'weighting' value of −40 for FC. Ohio substitutes percent of L–C, based on ultrasonic readings on the boar, for BF and also includes a soundness score. The Columbia, Mo., station includes LEA by ultrasonics in its boar index along with different 'weighting' values. Alabama, Arkansas, Illinois, and Tennessee include average percent H–L of littermate slaughter hogs, whereas Louisiana and Mississippi include a more complicated H–L index in the final boar index.

The Indiana boar index is calculated from points based on the deviation of the boar's performance from that of his contemporary test group. ADG, FC, BF probe, LEA by ultrasonics, and visual score are the traits included in the index. Current trends with boar indexes appear to be toward less reliance on carcass information from related slaughter hogs and the use of fewer traits in the index.

Qualification Standards

Of the States with central boar testing, all except California presently feature auctions of qualifying boars. Standards for qualification vary widely among States and are based mainly on individual or pen group performance for ADG, FC, and average BF probe. Several States also require that boars reach 220 pounds by a certain age, varying with the State, or require minimum standards for one or more carcass measurements of related slaughter pigs, or require that boars pass inspection for soundness and conformation by an advisory committee in order to qualify for public auction.

Minnesota, Virginia, and Wisconsin also certify boars for public auction if the boars' slaughter progeny groups at central test stations in these States meet certain performance standards. These standards vary considerably among the three States. Such boars are not centrally tested. All three States require that qualifying boars also meet varying on-farm testing standards.

All States testing slaughter pig groups also cooperate with purebred registries in providing test data for litter and sire certification programs. Several States also have separate programs to recognize consignors of test pens with the highest performance records.

All testing stations that sponsor public sales of qualifying test boars publish sale catalogs with pertinent information on test performance. State extension personnel in several of the States that conduct boar

or combined boar and slaughter pig testing also publish annual and long-term summaries of test results. Most States testing slaughter pig groups publish semiannual or annual reports and summaries. A few such States also publish long-term summaries. This information may be obtained from State personnel listed on pages 2–3.

Physical Facilities and Utilization

The building types and construction features of test facilities are summarized in table 3. The buildings fall into three general categories—open front, totally enclosed, and partially enclosed. The last type has doors that can be opened to outside pens. The use of bedding varies depending on geographic location and building type as well as the design of the pen floors.

Central swine-testing programs are continually changing. These changes may range from a minor shift in ration ingredients to a different test-group makeup. A major recent trend has been to test boars or combined groups of boars with related slaughter pigs. Use of ultrasonics in evaluating boars also is increasing. In addition, testing facilities recently have undergone major changes, with more being planned. These include a new abattoir and meats laboratory near the California testing station, a new meat quality laboratory for the Virginia station, and new or expanded facilities in Illinois, Louisiana, Mississippi, Missouri, Texas, and Wisconsin.

The swine-testing stations included here represent all major U.S. facilities that were not limited to private usage and that were in operation from September 1, 1971, through August 31, 1972. They were able to handle a total of approximately 3,652 test groups of all kinds and 3,099 groups were put on test during this period, representing 84.8-percent utilization.

One breakdown of the statistics is according to station capacity. Of eight stations with facilities to handle 40 or fewer test groups for the entire year, three operated at 90–98 percent of capacity, two at 60–69 percent, and three at under 40-percent capacity.

Of 17 stations with facilities for over 40 through 100 test groups, eight operated at 100 percent, four at 90–98 percent, three at 60–89 percent, and two at under 60 percent of capacity. Of 11 stations with facilities to handle over 100 test groups during the year, three operated at 100 percent, two at 90–97 percent, four at 60–89 percent, and two at under 60 percent of capacity. (Late dropouts of entries kept several stations from operating at 100 percent of capacity.)

Another breakdown on utilization is according to the type of tests conducted. Of the total capacity of 3,652 test groups, the stations allocated pens for testing 1,486 slaughter pig groups during the stated

TABLE 3.—*Description of physical facilities for testing swine*

Location of swine-testing stations	Test-group capacity [1]	Building type	Pen size	Floor	Bedding
	Number		*Feet*		
Alabama	60	Open front shed	5 by 10	Solid concrete	None.
Arkansas	20	Totally enclosed	4 by 10	⅓ concrete slats, ⅔ solid concrete.	Do.
California	12	Partially enclosed	5 by 10	100-percent wood slats, 2 by 6 inches, over lagoon.	Do.[2]
Colorado	12	Open front shed	46 inches by 20	Solid concrete	Do.
Florida	30	Totally enclosed	4 by 12	⅓ solid concrete, ⅔ raised wooden platform.	Do.
Georgia	96	Open, pole (metal roof over ⅔ of pen).	4 by 12	Solid concrete	Wood shavings.
Illinois	80	Open front shed (5 feet of pen covered).	5 by 17	100-percent slatted concrete	None.
		Totally enclosed	4.5 by 7.5	Solid concrete	Straw.
Indiana	96	Open front shed	6 by 12	do	Corn cobs and straw.
Iowa:					
Ames	120	Open front shed, all under roof.	5 by 20	do	Wood shavings and straw.
Eagle Grove	40	do	5 by 20	25-percent slatted concrete, 75-percent solid concrete.	Wood shavings.
Ida Grove	40	do	5 by 20	do	Do.
Lisbon	48	do	5 by 20	Solid concrete	Wood shavings and straw.
New Hampton	70	do	5 by 20	do	Do.
Kansas	40	Open front shed	4 by 16	do	Do.

See footnotes at end of table.

TABLE 3.—*Description of physical facilities for testing swine*—Continued

Location of swine-testing stations	Test-group capacity [1]	Building type	Pen size	Floor	Bedding
	Number		*Feet*		
Louisiana	50	Partially enclosed	6 by 14	6-foot solid concrete, 8-foot aluminum slats.	Straw (limited).
Maryland	20	Open front shed	6 by 12	Solid concrete	Straw.
Michigan	20	do	7 by 11. 5	do	Wood shavings.
Minnesota	98	Totally enclosed	6 by 12	do	Do.
Mississippi	24	Open side shed	5 by 16	do	Straw.
Missouri:					
Columbia [3]	72	Open front shed	6 by 16	do	Do.
Maryville	30	do	5 by 16	do	Wood shavings.
Montana	12	Totally enclosed	5 by 8	100-percent slatted concrete	None.
Nebraska:					
Clarkson [4]	50	do	4 by 10 and 4 by 16	⅓ slatted concrete, ⅔ solid concrete.	Do.
Wymore	60	Open front shed, all under roof.	5 by 16	Solid concrete	Straw.
North Carolina	100	Open front shed	5 by 14	do	None.
Ohio [5]	130	do	6 by 12	do	Straw and shavings.

Oklahoma	24	-----do	5 by 16	⅔ aluminum slats, ⅓ solid concrete.	None.
Pennsylvania	20	Open front, block construction.	5.5 by 12.5	Solid concrete	Straw.
South Dakota	24	Partially enclosed	6 by 20	-----do	Do.
Tennessee:					
Jackson	24	-----do	5 by 18	½ concrete slats, ½ solid concrete.	None.[6]
Spring Hill	24	-----do	5 by 18	½ aluminum slats, ½ solid concrete.	Do.
Virginia	40	Totally enclosed	4 by 12	⅓ oak slats, ⅔ solid concrete	Do.
Wisconsin:					
Belleville	60	Open front shed	6 by 16	Solid concrete	Straw.
East Troy	100	Totally enclosed	4 by 12	-----do	Do.
Mondovi	36	-----do	4 by 12	-----do	Do.
Platteville	42	-----do	4 by 12	-----do	Do.

[1] Test-group capacity refers to that at any one time. All stations have 2 regular nonadjoining test periods per year except Florida, which accepts entries throughout the year as vacancies exist, Illinois, which has a special test period for May and June farrowed litters, North Carolina, which has 2 6-month test periods with extended entry times, and the Mondovi, Wis., station, which has only 1 test period per year.

[2] Heat lamps used as needed.

[3] Also has 4 large pens to test progeny groups of 12 or more pigs in purebred Superior Meat Sire programs.

[4] Uses 4- by 10-foot pens for 3-pig groups and 4- by 16-foot pens for 4-pig groups; also has 3 large pens to test progeny groups of 12 or more in purebred Superior Meat Sire programs.

[5] Has 130 6- by 12-foot pens, of which 24 currently are allocated to boar tests (3 boars to a pen) with the balance used to test slaughter pigs from boar groups and also for litter tests.

[6] Heat coils in floor used if needed.

testing year. A total of 1,153 (77.6 percent) such groups were tested. The other pens were allocated for 2,166 test groups of boars or boars along with slaughter pigs. A total of 1,946 (89.8 percent) such groups were tested.

An estimated 4,486 boars were placed on test in these stations during the year, but not all finished their test. Also, some boars finishing their test were not sold at auction for breeding purposes.

Future of Central Swine-Testing Stations

Testing programs, including those at central testing stations, have contributed much to past and present improved swine populations in the United States. However, major changes taking place in the production of market hogs and in the production and distribution of swine seedstock are affecting all facets of the industry.

For example, large-scale operations for the production of market hogs have been established in ever-increasing numbers in many parts of the country. The small commercial producer may soon be out of business. With increasing demands for a higher quality market product at a lower production cost, these large commercial producers continually are looking for improved and tested breeding stock to incorporate into their herds. Competition is especially keen for the top tested boars.

At the same time, large specialized firms have developed which are producing purebred or crossbred and synthetic varieties of breeding stock, mainly boars, for sale primarily to commercial producers. Because of the large numbers of tested boars needed, central testing stations cannot possibly accommodate even a small proportion. Consequently, many of these large breeding firms now are testing on their own farms. Costs, space, and operational control are major factors in these trends.

There remains nevertheless the most urgent need to test and compare prospective young boars for use in the top breeding herds of the Nation. Central testing stations might well serve in this key capacity under proper conditions, However, those conditions likely could develop only under a comprehensive voluntary program for swine improvement that extends beyond breed and State lines. Such a program would be aimed primarily at (1) improving current testing and evaluation procedures; (2) utilizing existing and new testing facilities more efficiently to meet industry needs; and (3) increasing the contributions of the top breeding boars to improving the Nation's swine population.

In the long run, the success of central swine-testing stations depends largely on their contribution to the genetic improvement of the population. This in turn depends on many factors, including kind, reliability, costs, and health controls of testing programs offered, coordination with on-farm testing, utilization by leading breeders, and support by the entire industry.

Apparently a thorough reevaluation of central testing programs is needed if they are to retain a leading role in swine improvement in the United States. Of primary concern are the following items:

(1) *Standardization of testing procedures.*—The survey points up the many areas where more standardization of testing rules and procedures might be readily implemented, ranging from on-test ages and weights through carcass cutout and evaluation methods. Many of these changes could be made with little disruption of current programs and merit consideration by station management.

(2) *Kind of testing programs.*—Decisions are needed as to whether slaughter progeny groups, boars, or boars combined with slaughter sib groups are to be tested at central stations. Current trends point to increased demand for top centrally tested boars to help meet industry needs. Several stations have switched from slaughter test groups to the other two groups. A major unresolved question concerns the value of sib carcass information in evaluating boars.

(3) *Nonpurebreds and purebreds.*—Large seed-stock companies dealing in crossbred or synthetic strains of breeding stock rarely have tested at the central stations; instead they have confined their efforts to farms under their control. It is unlikely that this policy will change in the foreseeable future.

At the same time, most central test stations have not allowed testing of nonpurebred animals. Uncertainty of the effects of crossbreeding on performance and progeny tests and the general inclination of station management to promote purebreeding largely have determined this policy. However, some States have allowed nonpurebred stock to be tested if space is available, whereas only registered tested boars are sold at station public auctions.

Central testing probably will remain largely a purebred operation. As such, it is one of the best means available to the purebred breeder, both large and small, to improve and promote his herd and breed and remain competitive with the large nonpurebred seed-stock producers and distributors. Other means will need to be found to evaluate breeding stock from the latter firms for comparative purposes.

(4) *Allocation of testing space.*—The allocation of testing space to breeders demands the most careful consideration by all concerned.

This has not been a major problem in the past because usage at central testing stations generally has been below capacity. However, with the accelerated demand for tested boars in recent years, applications for testing space at central test stations also have increased markedly. Several stations already have been forced to ration their test pens and turn away numerous applicants.

This demand for tested boars appears to reflect not only higher market hog prices but also a growing awareness of the role of tested boars in herd improvement. Should demand for favorably tested boars and applications for boar-testing space at central stations continue to grow as expected, decisions soon will be needed on the criteria to use in allocating available testing space.

For maximum genetic impact, priority in central testing of boars probably needs to be given to those breeders who consistently meet or exceed acceptable standards of herd improvement practices and performance. However, for such restrictions to be most effective, they probably would need to be an integral part of a comprehensive voluntary program for swine improvement, extending across breed and State lines.

Comprehensive herd-testing programs, although essential for effective selection practices, are expensive to maintain. Conditions may arise where it might benefit the industry as a whole to partially subsidize central testing in order to provide adequate incentives for qualified breeders to participate.

Intensified research studies that have a direct bearing on all phases of current testing programs and procedures are urgently needed so that correct technical decisions can be made. Cooperative efforts by all sectors of the industry are equally essential in order to resolve the complex management and administrative problems now facing swine-testing programs in the United States.

PUREBRED-IMPROVEMENT PROGRAMS

Litter and Sire Certification

The detailed survey of central testing stations [4] also contains a summary of major testing programs sponsored by the eight largest purebred swine registries in the United States. All information was obtained through the cooperation of the respective executive secretaries. Each of these registries has a litter certification program based

[4] See footnote 2.

on two test pigs from a qualifying litter. Qualification rules include eligibility for registry, minimum litter size at farrowing, and freedom from visible inherited defects. Test pigs must be slaughtered at an approved slaughter plant and records adjusted to a basis of 220 pounds live weight at slaughter with standard correction factors.

Performance standards for adjusted records are shown in table 4. When both test pigs from a litter meet all standards for their breed, that litter will be recognized as a Certified Litter. When five litters by one sire qualify as Certified Litters, he will be recognized as a Certified Meat Sire or its equivalent. These five litters must be from five different dams, with a maximum of two full sisters or one daughter-dam pair among the dams. In addition, six of the breed registries have established at least one higher level of performance standards to recognize superior performance by litters and their sires. These special standards also are shown in table 4.

Additional Purebred-Testing Programs

Most of the breed registries also sponsor one or more additional testing programs. The Chester White, Duroc, Hampshire, Landrace, and Spotted registries sponsor a program that is useful primarily as a sire progeny test. Fifteen or more barrows and gilts from at least five litters by one sire are put on test at near 50 pounds' average weight and fed to 200–240 pounds. Feeding tests are conducted at testing stations, on the farm under strict surveillance, or at both locations. From 10 to 12 representative pigs are slaughtered at an approved plant. Specified test standards must be met in order for the sire to qualify as a Superior Meat Sire or its equivalent. Standards and testing rules vary slightly among breeds.

The Hampshire registry sponsors an on-farm herd-improvement testing program under close supervision. All pigs in each litter farrowed on the farm and registered are weighed at 200 to 240 pounds and examined with ultrasonics for BF and LEA. No performance standards have been set. The information is used primarily by the herd owner in his breeding program.

The Spotted registry sponsors a sire index program based on performance of a sire's progeny reported in the certification program noted previously. After a minimum of 10 head from five or more litters have been tested, the index is computed and updated automatically as records accumulate. Indexes are published in "Spotted News," the breed journal.

TABLE 4.—*Litter and sire certification standards for purebred swine programs*

Swine registry	Time to 200 pounds	Carcass			Litter designation	Sire designation with 5 such litters
		Length	Average backfat	Loin eye area		
	Days	*Inches*	*Inches*	*Square inches*		
BASIC CERTIFICATION STANDARDS						
Berkshire, Chester White, Duroc, Hampshire, Landrace, Poland China, and Yorkshire.	180 (max.)	29. 5 (min.)	1. 50 (max.)	4. 50 (min.)	Certified Litter	Certified Meat Sire.[1]
Spotted	175	29. 5	1. 45	4. 75	ditto	Do.
SPECIAL CERTIFICATION STANDARDS						
Berkshire	170	29. 5	1. 40	5. 0	Premium Certified Litter	Premium Certified Meat Sire.
	170	29. 75	1. 30	5. 0	Red Star Certified Litter	Red Star Certified Sire.
Duroc	165	30. 0	1. 20	5. 5	Gold Star Certified Litter	Gold Star Certified Sire.
Hampshire	165	30. 0	1. 32	5. 5	Pacesetter Certified Litter.	Pacesetter Certified Meat Sire.
Landrace [2]	170	30. 0	1. 40	5. 0	Certified Excellent Litter	Certified Meat Sire.
Spotted	170	30. 0	1. 30	5. 5	Pacesetter Certified Litter.	Pacesetter Certified Sire.
Yorkshire	180	31. 0	1. 48	4. 8	Superior Certified Litter	Superior Certified Meat Sire.

[1] A qualifying Landrace sire is awarded the designation Superior Meat Sire.

[2] The Landrace registry also requires a minimum of 40-percent ham and loin of chilled carcass weight for this standard.

U.S. GOVERNMENT PRINTING OFFICE: 1973 O—494-452